REMARKS/ARGUMENTS

Previously presented Claims 1 and 3-24 are pending in the Application. Applicant requests reconsideration of the final rejections of Claims 1 and 3-24 under 35 U.S.C. § 103 over Westfall (US 2002/0116868, published August 29, 2002) in view of Krull (U.S. Patent 6,364,918, issued April 2, 2002) because Applicant firmly believes that the Examiner has misinterpreted the teachings of Westfall and Krull. Westfall is concerned with stabilizing water in oil fuel emulsions. Krull is concerned with improving the lubricating properties of middle distillate lubricating oils. Krull seeks to improve the lubricating capacity of middle distillate hydrocarbon oils from which natural lubricants have been removed. Westfall's' water in oil fuel emulsions do not appear to have any lubricating deficiencies or lubrication needs. Accordingly, persons having ordinary skill in the art would not have been led by Krull's teaching (1) to replace the emulsifier Westfall used to stabilize its water in oil fuel emulsions with an oil-soluble lubricating copolymer Krull employs to improve the lubricating deficiencies of refined middle distillates, or (2) to add Krull's oil-soluble lower molecular weight lubricating copolymers to Westfall's water in oil fuel emulsions which already contain a higher molecular weight copolymer emulsion stabilizer which appears to be structurally similar to Krull's lubricating additives.

Rejections of Claims 1 and 3-24 under 35 U.S.C. 103 over Westfall in view of Krull

Previously presented Claims 1 and 3-24 are finally rejected under 35 U.S.C. 103 over Westfall in view of Krull. Office Action dated March 19, 2010 (OA). For the reasons stated hereafter, the rejections should be withdraw.

First, the Examiner acknowledges that Westfall is primarily concerned with stabilizing water in oil fuel emulsions using a high molecular weight copolymeric emulsifier in amounts from 0.1 to about 25 wt% (OA, pp. 2-3, bridging ¶). The Examiner also appears to acknowledge that while the emulsifiers Westfall employs are structurally to Applicant's

copolymeric anti-cavitation, Westfall's emulsifiers have molecular weights which greatly exceed the average molecular weight Mw of 700-3000 required of the copolymeric anti-cavitation additives in Applicant's claimed water in oil fuel emulsions (OA, p. 4, ¶ 1). Nevertheless, the Examiner states (OA, p. 4, ll. 3-4), "However, such copolymers are known in the art as fuel additives as evidenced by KRULL."

The Examiner finds that Krull employs the lower molecular weight copolymer which Applicant employs as an anti-cavitation additive for water in oil fuel emulsions, "to improve the lubricity of middle distillate fuel" when "added to the fuel in an amount of about 0.001 to 2% by weight (column 6, lines 12-28)" (OA, p. 4, 1st full ¶). On that basis alone, the Examiner concludes (OA, pp. 4-5, bridging ¶):

> [I]t would have been obvious to have added the copolymer of KRULL to the water emulsion composition of WESTFALL if its known imparted property was so desired. WESTFALL provides motivation for the addition of other well known fuel additives to the water-fuel emulsions in paragraphs [0081] and [0163]. Although the property of anti-cavitation is not disclosed in KRULL, fuel additives generally impart more than one property or function to the fuel. . . . [T]he fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious.

Applicant does not contest the Examiner's finding that Westfall contemplates adding other "additives . . . to the reactant emulsion, hydrocarbon fuel, emulsifier, water or combinations thereof" [0081] and the other additives include "cetane improvers, organic solvents, antifreeze agents, surfactants," [0081] "dyes, rust inhibitors . . . , bacteriostatic agents, gum inhibitors, metal deactivators, upper cylinder lubricants, and the like" [0163]. However, Westfall does not suggest that the emulsifiers which it critically adds to a water in oil fuel emulsion may be eliminated and replaced by a lower molecular weight copolymer which would not appear to be effective for stabilizing Westfall's water in oil fuel emulsion. Moreover, Westfall does not suggest to a person having ordinary skill in the art that its stabilized water in oil fuel emulsions are in need of any improved lubricity.

The Examiner's erroneous conclusion of obviousness stems from the Examiner's finding that Krull's "copolymes are known in the art as fuel additive[s]" (OA, p. 4, ll. 3-4). The Examiner's conclusion of obviousness in this case is appears to be based on the broad premise that it would have been obvious to add Krull's additive to Westfall's fuel composition because both Westfall and Krull express the need to add additives to hydrocarbon-based fuel oils. That conclusion is wrong. That conclusion disregards the divergent teachings in the references. Consider the following facts.

Westfall's emulsifiers are added to stabilize water in oil fuel emulsions. Krull's copolymer lubricants are added to middle distillates having a sulfur content of less than 0.5% by weight generally to improve the lubricating properties of lubricating oils (Krull, col. 1, ll. 7-14; col. 2, l. 63, to col. 3, l. 3; col. 6, ll. 8-46; col. 8, ll. 27-34). Krull specifically defines the term "middle distillates" as "mineral oils which are obtained by distillation of crude oil and boil in the range from 120 to 450°C, for example kerosene, jet fuel, diesel and heating oil" (Krull, col. 8, ll. 30-34). Krull's lubricating oils are not water in oil fuel emulsions and do not include at least 2% water as is required of all the water in oil fuel emulsions Applicant claims.

Krull teaches that oils lose their natural lubricity resulting from, inter alia, polyaromatic and polar compounds, when hydro-refining the fractions obtained from crude oil by distillation to remove the sulfur content (Krull, col. 1, ll. 15-39). Accordingly, it was Krull's objective to "find additives which result in an improvement in lubricity in middle distillates which have been substantially freed from sulfur . . . compounds" (Krull, col. 2, ll. 27-30). Suitable additives include oil-soluble copolymers having a molecular weight of 500 to 100,000 g/mol formed by polymerizing ethylenically unsaturated carboxylic acids and another ethylenically unsaturated monomer carrying OH groups (Krull, col. 2, ll. 33-62). Persons having ordinary skill in the art would have not been led to add one of Krull's lower

molecular weight lubricating copolymers to Westfall's water in oil fuel emulsions because Westfall's water in oil fuel emulsions appear to contain structurally similar higher molecular weight lubricating copolymers for the purpose of stabilizing the water in oil emulsion. Therefore, Westfall's water in oil fuel emulsions would not have needed improved lubricity. Nevertheless, Westfall's emulsifiers are both oil-soluble and have a molecular weight which appears to be substantially higher than Applicant's anti-cavitation additive.

Accordingly, the combined teachings of Westfall and Krull would not have suggested adding Krull's lubricity improving agents to Westfall's water in oil emulsion or taught, led, or motivated persons having ordinary skill to do so, because:

(1) There is no suggestion in the applied prior art that water in oil fuel emulsions need improved lubricity.

(2) There is no suggestion in the applied prior art that Westfall's stabilized water in oil fuel emulsions need improved lubricity

(3) Westfall's water in oil fuel emulsions appear to contain higher molecular weight copolymers structurally similar to Krull's additives as emulsifiers.

(4) Westfall does not recommend using emulsifiers having average molecular weights ranging from 700 to 3000 to stabilize its water in oil fuel emulsions.

(5) There is no suggestion in Krull that its lower molecular weight oil-soluble copolymers, which are said to improve the lubricity of desulfurized middle distillates which boil from 120-450°C, would be useful for improving the lubricity of water in oil fuel emulsions or further improving the lubricity of Westfall's stabilized water in oil fuel emulsions.

Persons having ordinary skill in the art reasonably would not have been led by the combined teachings of Westfall and Krull to add Applicant's anti-cavitation additives having

an average molecular weight of 700 to 3000 to water in oil fuel emulsions for any reason. Krull is concerned with improving the lubrication of lubricating oils. Westfall is concerned with stabilizing water in oil fuel emulsions. On the other hand, Applicant claims a water in oil fuel emulsion including a low molecular weight anti-cavitation additive which prevents deterioration inside a fuel delivery system. The combined teachings of Westfall and Krull suggest nothing of the kind explicitly or implicitly.

Applicant's counsel previously discussed the differences between improving anti-cavitation and improving lubricity, the fact that anti-cavitation activity reduces evaporization of water in motor vehicle fuels comprising water and liquid hydrocarbon, the fact that Krull's teaching is directed to improving the lubricity of lubricating oils, the fact that Krull's teaches improving the lubricity of lubricating oils using "oil-soluble copolymers", and the fact that Applicant alone recognized the cavitation problem and the anti-cavitation benefits of the lower molecular weight copolymers Applicant added to water in oil fuel emulsions. Krull's copolymers for improving the lubricity of hydrocarbon middle distillates and the copolymer additives employed by Applicant for preventing cavitation by reducing evaporation of water do appear to be similar. The Examiner continues to argue that it would not have been obvious to add Krull's lubricity-improving additives to Westfall's fuel emulsions to improve the lubricity of Westfall's hydrocarbon-containing fuel emulsion. More particularly, the Examiner argues that it would have been obvious for a person having ordinary skill in the art to add Krull's low molecular weight copolymer to Westfall's water in oil fuel emulsion to improve lubricity. The Examiner argues that it is not necessary for the prior art to suggest or expect the same or similar utility recognized by Applicant in order to show the obviousness of the invention Applicant claims. *In re Dillon*, 919 F.2d 688, 693 (Fed. Cir. 1990). Here, however, persons having ordinary skill in the art reasonably would not have been led to make

and use the water in oil fuel emulsion Applicant claims for any purpose described in Westfall, Krull, or a combination thereof.

Again, Westfall's fuel is a water-in-oil fuel emulsion, whereas Krull's oil is a hydrocarbon middle distillate. Anti-cavitation activity is associated with water-in-oil fuel emulsions. Krull is not concerned with water-in-oil fuel emulsions. The Examiner recognized the dichotomy (OA, pp. 5-6, bridging ¶). The fact that the inventions described by Westfall and Krull have common hydrocarbon oil and copolymer additive components does not permit the artisan to completely disregard the dissimilarities in, and the benefits of, the components described by each reference and how those components differ from those of the modified water in oil fuel emulsion Applicant claims and it properties. The entire body of evidence must always be considered as a whole. *In re Margolis*, 785 F.2d 1029, 1031 (Fed. Cir. 1986).

Krull does not teach that copolymers which improve the lubricity of middle distillates boiling above 120°C would also affect the lubricity of water-in-oil fuel emulsions. Applicant's anti-cavitation additives, unlike Krull's oil-soluble lubricity-improving additives, must interact with the aqueous phase of the water-in-oil fuel emulsions to be effective. Krull is not concerned with any damage 2 to 40 wt% of water can do to a fuel line.

Applicant's previously presented Claims 1 and 24 require 2-40% by weight of water. Claim 10 requires 3-20% by weight of water, and Claim 20 requires 4-10% by weight or water. Nevertheless, the Examiner finds no distinction between water in oil fuel emulsions including oils and middle distillate lubricating oils excluding water (OA, pp. 6-7). However, Krull makes the distinction. Krull's lubricating oils are middle distillate lubricating oils which boil at temperatures from 120-450°C (Krull, col. 8, ll. 27-47). Krull's lubricating oils do not include significant amounts of water.

Next, the anti-cavitation additive in Applicant's claimed water in oil fuel emulsion is a copolymer having an average molecular weight Mw ranging from 700 to 3000 which is formed by copolymerizing an 20-80 mole% of an ethylenically unsaturated carboxylic acid and 80-20 mole% of at least one other ethylenically unsaturated monomer and converting at least 20 % of the acid groups to a carboxylate salt, ester, amide or imide derivative. The molecular weight of Westfall's fuel-soluble emulsifiers is substantially higher. Nevertheless, the Examiner argues (OA, pp. 6-7, bridging ¶) that Westfall suggests adding an upper cylinder lubricant at [0163]. Therefore, the addition of any one of Krull's additives to improve lubricity purportedly would have been obvious and inherently would have provided the anticavitation benefit (OA, pp. 7-8).

First, Westfall does not recommend adding lubricants to water in oil fuel emulsions. Westfall teaches that upper cylinder lubricants may be added if and when necessary [0163]. Second, the higher molecular weight copolymers Westfall adds to stabilize its water in oil fuel emulsions also appear based on Krull's teaching to effectively provide improved lubricity. The Examiner has not explained why persons having ordinary skill in the art would wanted to further improve the lubricity of Westfall's water in oil fuel emulsions by adding a lower molecular weight copolymer to provide additional lubricity or by replacing Westfall's higher molecular weight copolymer with a lower molecular weight alternative which Westfall strongly suggests would not desirably stabilize the water in oil fuel emulsion. Persons having ordinary skill in the art would not add superfluous lubricating additives to Westfall's water in oil fuel emulsions which already appears to comprise a lubricating additive or replace Westfall's critical additive which appears to provide multiple benefits with one that does not provide the one benefit most important to Westfall.

The Examiner argues that Westfall and Krull must be considered for their combined teachings and suggestions to make and use a water in oil fuel emulsion including a copolymer

additive which inherently provides anti-cavitation benefits. However, the Examiner would have the ordinary artisan disregard all the teachings in Westfall and Krull which would have led persons having ordinary skill in the art NOT to add Krull's lower molecular weight copolymers to Westfall's water in oil fuel emulsion. Westfall's water in oil fuel emulsions apparently do not appear to need Krull's lower Mw lubricity-improving copolymers. Westfall prefers to use Krull's higher Mw copolymers because they critically stabilize water in oil fuel emulsions. Whether or not Westfall's emulsifier also lubricates is immaterial to Westfall's needs. Moreover, Westfall's higher Mw copolymer would appear to perform all the functions Krull's lower Mw additives perform and also perform the significantly more important function of stabilizing the water in oil fuel emulsions. Why would persons having ordinary skill in the art have wanted to replace an additive which would not to satisfy Westfall's most critical stabilizing needs with an additive which would not to satisfy Westfall's most critical stabilizing needs? The Examiner's conclusion of obviousness defies common sense. Persons having ordinary skill in the art are known to exercise common sense and act accordingly. *In re Sovich*, 769 F.2d 738, 742-43 (Fed. Cir. 1085); *In re Bozek*, 416 F.2d 1385, 1390 (CCPA 1969).

Applicant's anti-cavitation additives are used exclusively in water-in-oil fuel emulsions. Applicant's anti-cavitation additives are not the fuel-soluble, higher molecular weight copolymers Westfall requires to stabilize water in oil fuel emulsions. It would not have been obvious to add Krull's lubricity-improving lower molecular weight copolymers to Westfall's water in oil fuel emulsions to perform any function not inherently performed by Westfall's higher molecular weight copolymer additives. Persons having ordinary skill in the art do not add lubricity-improving additives to compositions which are not in need of improved lubricity. Nor do persons having ordinary skill in the art replace multifunctional higher molecular weight additives with single functional lower molecular weight additives

which Westfall suggests cannot provide the critical benefit provided by the higher molecular weight additives. Westfall is focused on stabilizing water in oil fuel emulsions. Krull is interested in replacing the natural lubricants removed from hydrocarbon middle distillates when processing to remove unwanted sulfur compounds. Westfall's water in oil fuel emulsions do not appear to have deficient lubricity. In light of Krull's disclosure, persons having ordinary skill in the art would strongly suspect that Westfall's high higher molecular weight copolymer additive not only stabilizes the water in oil fuel emulsion but also satisfactorily sufficiently lubricates the water in oil emulsion. Persons having ordinary skill in the art would not have been led by Krull's disclosure to unsolve a critical problem solved by Westfall's higher molecular weight additive simply to use a lower molecular weight lubricating additive without some benefit.

Westfall's aqueous fuel emulsions may include emulsifiers (i) which are hydrocarbon fuel-soluble products "made by reacting at least one hydrocarbyl-substituted carboxylic acid acylating agent with ammonia or an amine" [0109]. However, each hydrocarbyl substituent of the acylating agent has about 50 to about 500 carbon atoms [0109] and a number average molecular weight ranging from 700 to 3000 [0110]. Westfall's hydrocarbyl-substituted carboxylic acid acylating agent is made by "reacting one or more alpha-beta olefinically unsaturated carboxylic acid reagents containing 2 to about 20 carbon atoms, exclusive of the carboxyl groups, with one or more olefin polymers" [0111]. The Examiner appears to recognize (OA, p. 4, 1st ¶) that Westfall's emulsifier (i) is a reaction product of a polyolefin having an average molecular weight of 700 to 3,000 and an ethylenically unsaturated carboxylic acid. The resultant polymers have numerous hydrocarbyl sequences, each of which have an average molecular weight of 700 to 3000. Persons having ordinary skill in the art would have understood that the average molecular weight of the reaction products of an olefin having a hydrocarbyl sequence with an average molecular weight of 700 to 3000 and

20 % to 80 mole % of olefinically unsaturated carboxylic acid monomers must have an average molecular weight significantly higher than the 700 to 3000 average molecular weight attributed to one one of the hydrocarbyl substituents. Westfall's emulsifiers (i) wherein each hydrocarbyl substituent has an average molecular weight higher than the 700 to 3000 cannot be prepared by copolymerizing 20-80% in moles of an ethylenically unsaturated carboxylic acid monomer containing at least one carboxylic acid group and 80-20% in moles of at least one other ethylenically unsaturated monomer and then further reacting at least 20% in moles of the carboxylic acid groups in the prepared copolymer with an amine.

Westfall's emulsifiers include many polyolefin hydrocarbyl substituents having an average molecular weight of 700 to 3000 in order to improve the solubility of the emulsifiers in the hydrocarbon fuel phase of its water in oil fuel emulsion. Accordingly, Westfall's emulsifier would not be expected to reduce the surface tension of the aqueous phase of a water in oil fuel emulsion as does Applicant's significantly lower molecular weight anti-cavitation additives. Westfall's emulsifiers stabilize the aqueous hydrocarbon fuel emulsions. Westfall's emulsifiers are not anti-cavitation additives of the kind Applicant currently claims.

Westfall also describes an emulsifier (v) which is "the reaction product of A) a polyacidic polymer, B) at least one fuel soluble product made by reacting at least one hydrocarbyl-substituted carboxylic acid acylating agent, and C) a hydroxyl amine and/or a polyamine" [0126]. Examples of Westfall's polyacidic polymers include alpha-olefin/maleic anhydride copolymers [0128], maleic anhydride/styrene copolymers, poly-maleic anhydride, acrylic and methacrylic acid containing polymers, polyacrylates [0129-0132]. A representative example of Westfall's fuel soluble emulsifier (v) is made by reacting at least one hydrocarbyl-substituted carboxylic acid acylating agent and a hydroxyl amine and/or a polyamine with a polyacidic polymer [0127] and then crosslinking "with an olefin/maleic anhydride copolymer [0133].

Again, while Westfall's emulsifier (v) appears to resemble the anti-cavitation copolymer additive Applicant claims, Westfall's pre-reacted fuel soluble products are hydrocarbon fuel-soluble products "made by reacting at least one hydrocarbyl-substituted carboxylic acid acylating agent with ammonia or an amine" [0109]. The hydrocarbyl substituent of the hydrocarbyl-substituted carboxylic acid acylating agent reactant used to prepare Westfall's emulsifier (v) itself has about 50 to about 500 carbon atoms [0109] and a number average molecular weight ranging from 700 to 3000 [0110]. It is that hydrocarbyl-substituted carboxylic acid acylating agent which Westfall reacts with an hydroxyl amine and/or a polyamine [0126] and a polyacidic polymer to prepare its emulsifier (v).

Again, persons having ordinary skill in the art reasonably would have understood that Westfall's reaction products are formed by reacting an hydrocarbyl-substituted carboxylic acid acylating agent with a hydroxyl amine and/or a polyamine and then reacting the product with every available carboxylic acid group in Westfall's polyacidic polymer coreactant to form emulsifier (v). Thus, every carboxylic acid group in Westfall's polyacidic polymer co-reactant is an ester or an amide of a hydrocarbyl-substituted carboxylic acid acylating agent having a minimum average molecular weight of 700 to 3000. Accordingly, the average molecular weight of Westfall's emulsifier (v) far exceeds the average molecular weight of 700 to 3000 Applicant requires for the anti-cavitation copolymer additive in the water in oil fuel emulsion defined by Applicant's claims.

Thus, Westfall's emulsifiers do not inherently eliminate any of the "cavitation" problems the art faced or reduce the surface tension of the aqueous phase of aqueous hydrocarbon fuel emulsions. Westfall's emulsifiers are significantly different from Applicant's anti-cavitation copolymers both in chemical structure and average molecular weight. Westfall's emulsifiers stabilize water in oil fuel emulsions. Applicant's additives reduce "cavitation" problems associated with water in oil fuel emulsions without

detrimentally effecting the stability of the aqueous hydrocarbon fuel emulsion (Spec., p. 5, ll. 2-7). Persons having ordinary skill in the art reasonably would have understood that the invention defined by Applicant's claims is significantly different from the subject matter Westfall discloses.

To sustain a rejection for obviousness under 35 U.S.C. 103, the prior art must reasonably suggest the claimed subject matter with a reasonable expectation of success. *In re O'Farrell*, 853 F.2d 894, 903 (Fed. Cir. 1988). The combined teachings of Westfall and Krull reasonably would not have suggested the subject matter Applicant claims for any apparent reason. Westfall would not have taught persons having ordinary skill in the art that stable water in oil fuel emulsions can be obtained using lower molecular weight emulsifiers. Furthermore, Westfall's water in oil fuel emulsions should not have a lubricity problem in light of Krull's suggestion that Westfall's higher molecular weight emulsifier would inherently solve any lubricity problems. There must be some reasonable suggestion from the combined prior art disclosures to do what Applicant has done to support a rejection for obviousness. Here, Westfall suggests that Krull's low molecular weight additives would be useless for stabilizing Westfall's improved water-in-oil fuel emulsions or unimproved water in oil fuel emulsions. Why would persons having ordinary skill in the art replace Westfall's effective higher molecular weight additive with a lower molecular weight additive which provides no more lubrication yet far less emulsion stabilization? Persons having ordinary skill in the art would not do so.

For the reason stated, Applicant's previously presented claims are patentable over the applied prior art and in condition for allowance. Early Notice of Allowance is respectfully requested.

Respectfully submitted,

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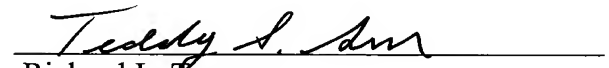

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